9

MANAGING DESIGN AND CONSTRUCTION

Although the Europe Division (EUD) evolved as an organization under a succession of commanders between 1977 and 1988, the engineer mission in Europe remained constant. John Blake, who served as chief of construction during most of that decade, trenchantly defined that mission: "The real reason we are here is to build things, [to] repair things … for the benefit of the soldiers and airmen in Europe."[1]

Building things for soldiers involved EUD in an increasingly vast, volatile, and complex operation. By 1980 the division managed military construction in countries from the North Sea to the eastern Mediterranean and the Caspian Sea, a land mass roughly one-third the size of the United States that stretched over a distance slightly greater than that between New York and San Francisco. In 1977 EUD operated under eleven different working agreements in seven countries; by 1987 that had increased to twenty agreements with eight countries. (*See Map 18.*) Staff in the division conducted business daily in a variety of languages and under a multiplicity of national laws, regulations, and customs.[2]

Although the volume of work measured in dollars was not the largest in the Corps of Engineers, EUD workload, when measured by the number of projects, was larger than any other engineer organization in the world. In 1977 the division administered 1,800 projects in design and another 300 in construction. Over the next decade the number of design projects remained in the same high range, while the volume of construction placement increased as design projects moved to the construction phase—from $130 million in 1977 to $492 million in 1986. The EUD leadership cadre judged its task in dealing with these projects, many of them quite small, as far more complicated than administering a handful of multimillion-dollar contracts for a single customer, as the newly created Middle East Division seemed to be doing. By 1986 EUD had more than twenty customers, including the Army, the Air Force, the Navy, and eight Department of Defense agencies. The division's funds were drawn from fifteen sources,

Map 18

and it paid its bills in almost as many currencies, each of which had different and fluctuating rates to the dollar, a factor often ignored by Congress and planners in the Pentagon.[3]

Many of the Europe Division's tasks demanded quick action and rapid completion. Design and construction frequently had to be executed in fewer than twelve months. On longer projects, initiation was often urgent; work had to be started before all the requirements had been defined. This meant that the scope of projects changed as the work progressed,

complicating execution and increasing the costs of both design and construction.[4] This volatility had been characteristic of the engineer mission in Europe for much of the period since the end of World War II. It was not a characteristic of most civil works projects managed by the Corps of Engineers in the United States.

The vastness, complexity, and volatility of EUD's work make it difficult to describe in simple and consistent terms. Indeed, a single descriptive framework cannot adequately portray the division's many tasks. Several of the many ways in which the U.S. Army Corps of Engineers, the Europe Division, and its customers described and measured the division's activities are explored below, including methods of contracting, sources of funding, and management of the work through the field offices.

Methods of Contracting

Like its predecessor organizations in Europe, EUD relied largely on contractors. Architect-engineer firms designed projects and construction companies built facilities ranging from missile sites, hardstands, and barracks to hospitals and bowling alleys.

In the European context the predominant method of contracting was *indirect*; that is, U.S. military engineers depended on host-government agencies to award contracts for design, construction, or both. Representing the interests of the U.S. government and the military user, EUD prepared the original contract package, whether for design or construction, and approved the final product.[5] The process was called *direct contracting* when EUD awarded contracts without a host-government agency as intermediary.

The Europe Division generally relied on contractors to complete facilities, such as this prison in Mannheim.

Three options existed for a project assigned to the Europe Division. First, design and construction could be indirect, in which case the host nation awarded the design and construction contracts. Second, design and construction could be direct, in which case EUD awarded both contracts. Third, EUD could contract directly for design and indirectly for construction, meaning that EUD awarded the design contract and the host nation awarded the construction contract. Theoretically,

a fourth option existed, but a project designed by a host nation would almost invariably be built by it as well.[6]

The process for handling any particular project was determined by one of the many country-to-country agreements under which EUD worked. Generally, those agreements specified that the host nation retained control of all construction within its territory. Each nation, of course, followed different rules and customs concerning the nature of the contract, contracting procedures, selection of materials, guarantees, and the like. A look at contracting in two countries, Turkey and West Germany, illustrates some of the complexities EUD's management personnel handled.

Construction of even this simple warehouse near Ankara involved special measures to strengthen the Turkish construction industry.

Contracting in Turkey

Turkey was geographically remote from the center of the U.S. military presence in Europe, and its construction industry was less sophisticated than that of central and western European countries. These factors conjoined to make Turkey the focus of disproportionate attention from EUD personnel.

EUD inherited a difficult arrangement in Turkey. The United States had imposed an arms embargo in 1974 in response to Turkish action during a crisis over Cyprus. The government of Turkey thereupon cancelled the Defense and Economic Cooperation Agreement that regulated U.S. military construction in the country. In negotiations for a new agreement in 1975–1976, the Turkish government insisted on extensive control over contracting and construction. All projects had to be approved by the government of Turkey, which reserved the right to review all contractual documents. The Turkish government submitted names of approved bidders for contracts; bid openings and negotiations had to include official Turkish representatives; the government insisted on placing a resident engineer on each job; and, for projects prefinanced by the United States, the Turkish government received 3 percent of all funds recovered from the North Atlantic Treaty Organization (NATO).[7]

The new Defense and Economic Cooperation Agreement also committed the United States to foster Turkish economic development as well as

joint defense. To the extent feasible, the United States agreed to procure all materials, labor, and all other services in Turkey. The Turkish government strictly enforced the limits on imports and insisted on approving lists of construction materials before construction could even begin. These procedures contributed substantially to delays in construction.[8]

To fulfill the United States' commitment to foster economic development, EUD sought to introduce advanced methods into the Turkish construction industry whenever possible.[9] The United States Engineer Group (TUSEG) provided training for both contractors and workers, including on-the-job training, films, and seminars on topics such as contracting, construction methods, and asbestos removal. This special effort enabled more Turkish contractors to meet U.S. specifications.[10]

Contracting in West Germany

The authority that the Turks insisted on retaining over decisions concerning U.S. military construction graphically shows how important the issue of control is in any country. It was no less important in West Germany, where the Europe Division constructed the majority of its projects and where relations between the United States and Germany had a very different history from the relations between the United States and Turkey. The agreements governing contracting for military construction in Germany first took shape during the 1950s, when the Federal Republic's sense of sovereignty was tentative and Soviet power threatened Western Europe. As West German self-confidence grew and as Germans began to discount the Soviet threat, the Federal Republic asserted its right to control military construction within its own boundaries.

United States Army, Europe (USAREUR), and West Germany signed the basic agreement, the *Dollarbaukontrakt*, (Dollar Construction Contract), in 1956. Modified in 1961, this agreement formed the basis for all dollar-funded design and construction executed in the Federal Republic. Coupled with the supplementary agreement to the NATO Status of Forces Agreement signed in 1959, these accords governed indirect contracting for U.S. military construction.[11] According to the basic law (constitution) of the Federal Republic, the ten West German *Länder* (states) were the enforcing agencies of federal statutes. Under this decentralized system, federal laws were frequently interpreted differently at each building site, forcing Army engineers to prepare designs to meet the standards in different German localities.[12]

In the mid-1950s, when West Germany achieved sovereignty, new procedures replaced those governing U.S. military construction. With adaptations that strengthened German control, these procedures remained in force in 1974. Thus, EUD dealt directly with the Ministry of Defense or the Ministry of Construction in Bonn primarily to work out general agreements concerning construction programs. At the local level, where actual building took place, contracts with builders came under the jurisdiction of states and localities. The Bonn ministries signed contracts with the

U.S. agency and issued federal construction orders to state construction offices (*Oberfinanzdirektionen*), which in turn passed the orders to local construction offices (called variously *Landesbauämter*, *Staatsbauämter*, or *Finanzbauämter*) for execution. EUD had only indirect contact—and no contracts—with the company executing the work. The division's contracts for U.S. military construction were with the appropriate West German governmental agency.[13]

For reasons of coordination, contracts drawn up by EUD for the Ministries of Defense or Construction passed through the West German government's *Bautechnische Arbeitsgruppe* (Technical Working Group for Construction), created in 1956.[14] This agency, which maintained its offices in Frankfurt, proved over the years an indispensable ally. In recognition of the value of its role, EUD presented the director of this German agency, Viktor Krupinski, with the U.S. Department of the Army's Outstanding Civilian Service Award days before his retirement after a nineteen-year tenure. In a small ceremony on 26 February 1976, EUD lauded Krupinski's role in facilitating construction for the Nike and Mace missile programs of the early 1960s, the Hawk program of 1965–1968, the TAB VEE (Theater Air Base Vulnerability Evaluation Exercise) aircraft shelter program, and the two German-financed programs of the 1970s to modernize U.S. facilities.[15]

As West Germany became more confident of its position in international affairs, it sought to bring U.S. (and other) military construction under its control. The effort culminated during the 1970s in negotiations concerning the *Auftragsbautengrundsätze* (*ABG–75*), the principles of contract construction formulated by the Federal Republic to replace the bilateral agreements of earlier years. In the negotiations for *ABG–75*, the West Germans maintained that one single accord ought to govern all six NATO countries with troops in Germany and that construction should be contracted through German government agencies, that is, through indirect contracting.[16] These were all assertions of sovereignty that France had insisted upon thirty years earlier. Most of West Germany's NATO partners signed *ABG–75* in the late 1970s, but the United States resisted signing until 1982.[17]

The United States held out for several years because it continued to find advantage in the older agreements that permitted it to engage in direct design, without the intermediary of an official German agency, and some direct construction. In addition, U.S. law prohibited some of the financial arrangements accepted by the other nations. Over several years EUD's experience showed that, compared to projects designed indirectly, projects designed directly encountered more frequent delays in the German review process and required an undue number of contract modifications, leading to missed schedules and increased costs. Brig. Gen. George Kenyon "Ken" Withers, Jr., concluded that the German administration of construction was doing "a good job," and he favored signing *ABG–75*. He argued that implementing it would have a negligible effect on EUD's internal operations. On 29 September 1982, the United States,

represented by USAREUR, and the Federal Republic of Germany, represented by the Ministry of Construction, signed the agreement; it became effective on 1 October.[18]

Projects and the Process

Because managing the design and construction process from start to finish made up a major part of EUD's day-to-day work, the process itself merits review. The division processed the idea for any project through three phases: (1) planning, which shaped the idea and secured funding for it; (2) design, which translated the plan into a constructible project; and (3) construction, which turned it into mortar, bricks, and boards, giving the original idea its three-dimensional reality.

Planning

If a project idea arose in a military community, the community commander turned first to his facilities engineer, who defined the idea in relation to the community's mission and decided whether the local engineer staff had the resources to develop the concept design sufficiently to obtain congressional funding. The facilities engineer assessed the characteristics of the site in relation to the project, checked access to utilities and communications, and weighed any other economic or environmental factors that bore on the prospects of completing the project. If the local facilities engineer could not provide these basic design services, the military community turned to the next highest level, USAREUR's Directorate of Facilities Engineering (reorganized and renamed the Directorate of Engineering and Housing [DEH] in 1976). Either the facilities engineer or the DEH could also decide to bring in EUD to help with this advanced planning.[19]

If the project originated as a part of a new weapons system or some other aspect of direct combat support, it would come to EUD at the end of the concept design or advanced planning stage, because the Europe Division acted as sole agent to manage design and construction for all Military Construction, Army (MCA), projects and, upon request, for the Military Construction, Air Force (MCAF), projects. By contrast, EUD might or might not manage Operations and Maintenance, Army (OMA), projects or projects funded from other sources.

By the late 1980s, in an effort to improve customer satisfaction, EUD had instituted a predesign conference for each project as part of this planning phase. This became the initial and most critical point of interaction between the division staff and the originators of the project idea. At this meeting, the participants reviewed all documents, especially the initiating document (Department of Defense form 1391) and the project development brochure, and determined whether the scope of work accurately reflected the user's needs.[20]

When completed, the planning phase brought the project to 35 percent completion of design. The Army engineers had calculated a current

working estimate, the total cost of the project through final construction, required of any project included in the military budget presented to Congress. When Congress approved a project, it used the current working estimate as the program amount—the total funds authorized and appropriated for the project.[21] EUD also used the working estimate when describing its workload; the volume of work was generally expressed as the total working estimate of all projects currently under design.

By the mid-1980s, an EUD-organized conference had evolved to review work before USAREUR proposed a project to the Department of the Army. The DEH, the user, the designer, and the EUD representative discussed the review comments received during the planning phase, resolved their differences, and approved the concept design. The assumption was that once concept review was completed, no further changes would occur in either the operational or the functional requirements for the project.[22]

Design

The design phase, managed by EUD's Engineering Division, had its own three stages: preliminary design, which built on the earlier planning phase; prefinal design; and final design. Staff in the division might do direct design of a project, or EUD might engage an outside architect-engineer firm to execute direct design. For indirect design, either a German government agency executed the work or the agency engaged an architect-engineer firm to complete the design. In these cases, EUD monitored, verified, oversaw, and cajoled to bring the work to completion on time and within the budget.[23]

The preliminary design phase carried the project from 35 to 50 percent design. EUD screened the project again to ensure that it conformed to statutory, regulatory, and administrative requirements and qualified for the designated funding category (OMA, MCA, and others). The staff verified that a project had a clearly defined scope of work and realistic cost estimates, checked the adequacy of the funding made available for design, and calculated EUD management fee as a percentage of the design costs. The division's Technical Review Branch reviewed architectural drawings and functional layouts in detail to ensure the adequacy of electrical, mechanical, and other distribution systems. EUD review of the preliminary design stage also encompassed exterior utility systems, roads, parking areas, landscaping, and secure sources of power and water. Staff reviewed the project's completion dates and coordinated necessary changes with the user. Completion dates were critical for projects funded by OMA, because these funds had to be returned if not obligated during the fiscal year in which the project was approved.[24]

Near the end of the preliminary phase, EUD coordinated a user review of the original cost estimates to refine and check them against the approved budget. All parties then checked the preliminary design again. When EUD received the signed approval of design and cost estimates from the user, the next stage—prefinal design—began.[25]

During the prefinal stage, EUD design staff or contractors prepared detailed drawings of the facilities involved in the project. This stage also included the final calculations and structural analyses, the preparation of complete specifications, and a detailed review of costs based on actual quantitative measurements taken from the drawings. The design team again checked all elements of the design for technical accuracy and completeness. When the prefinal stage was completed, a project was 90 percent through the design cycle.[26]

During final design, the division staff prepared or monitored a contractor's preparation of construction drawings and specifications, again coordinating the work with the user. EUD also prepared any special statements relating to legal and administrative aspects of the contract as it put together the final contract documents. Staff assembled the completed drawings, the specifications, and the legal paperwork into a bid package for construction.[27]

The final review conference marked the culmination of the design phase. A project manager in the Engineering Division gathered the final design documents and sent them to all the participants with notice of the date for the design conference. One last review of the design was done to ensure that the facility as designed met the operational and functional needs of the intended user.[28]

If a revised working estimate for the project exceeded the program amount appropriated by Congress, EUD had to send an explanation to Headquarters, United States Army Corps of Engineers (USACE) in Washington, which administered the appropriated funds. USACE sent EUD an authorization to solicit bids or to award the construction contract. At the moment of approval, USACE transferred to EUD 85 percent of the amount appropriated by Congress for the project. Once the division received the money and all clearances, the bid package was distributed to construction contractors qualified to handle the work.[29]

Construction

With the design phase completed and the project funds received, the construction phase began, with EUD's Construction Division monitoring the project. Much of the day-to-day work passed to the area offices, resident engineer offices, and project offices. The preconstruction conference brought together the representatives of the contractor (and principal subcontractors) and EUD area or resident engineer. The conference also frequently included representatives of the user and the community, the facilities engineer, or additional EUD personnel at the invitation of the area or resident engineer.[30]

Field personnel monitored progress at the construction site, including necessary testing, property administration, cost reporting, user liaison, record keeping, labor relations, safety, job site security, quality assurance, and personnel administration. When the volume of work

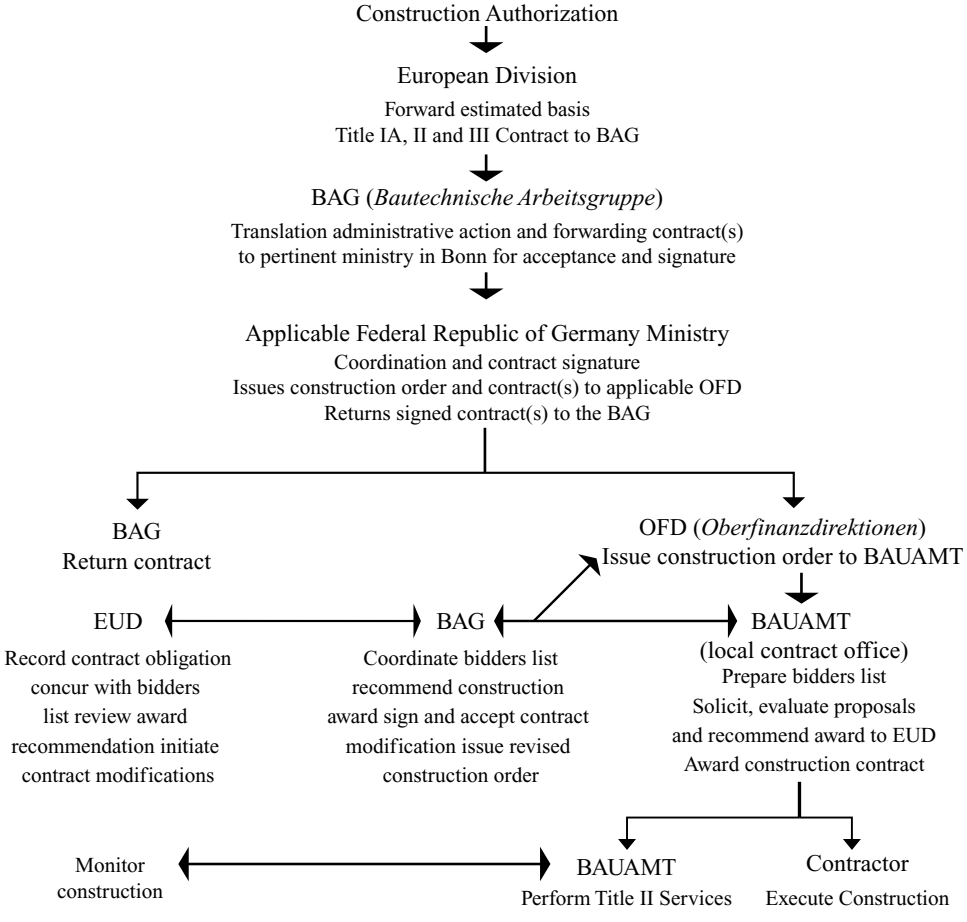
Europe Division personnel in Sinop, Turkey, monitored each construction project as it progressed.

or the remoteness of the site warranted, the Europe Division opened a project office at or near the job site. Throughout the construction phase, staff in the Construction Division in Frankfurt provided an array of support and technical expertise to solve the more difficult problems.[31] Monitors ensured that the contractor stayed on schedule, adhered to the contract price, and executed the plan's special and general conditions and specifications. Field office personnel also tracked funds and negotiated changes, within limits, while they forwarded to Frankfurt any changes that exceeded their authority.[32]

The Construction Division managed periodic inspections, controlled funds, and administered the contract to ensure that the contractor delivered high-quality work on time and within budget. Headquarters staff and field personnel worked in concert to conduct the prefinal inspection of the construction site before turning the facility over to the user. They also assessed and acted upon any deficiencies identified in the final inspection.[33]

Because the indirect method of contracting put a bureaucratic layer between EUD and the executor of the work, EUD had little leverage to delay payment to the contractor or to cancel the contract. The indirect method of contracting in the Federal Republic of Germany also fostered opportunities for delay. (*Chart 12*) The average time involved in seeing an indirect contract to completion was 24.5 months.[34] (*See Chart 13.*)

Chart 12: Indirect Contracting Process in the Federal Republic of Germany

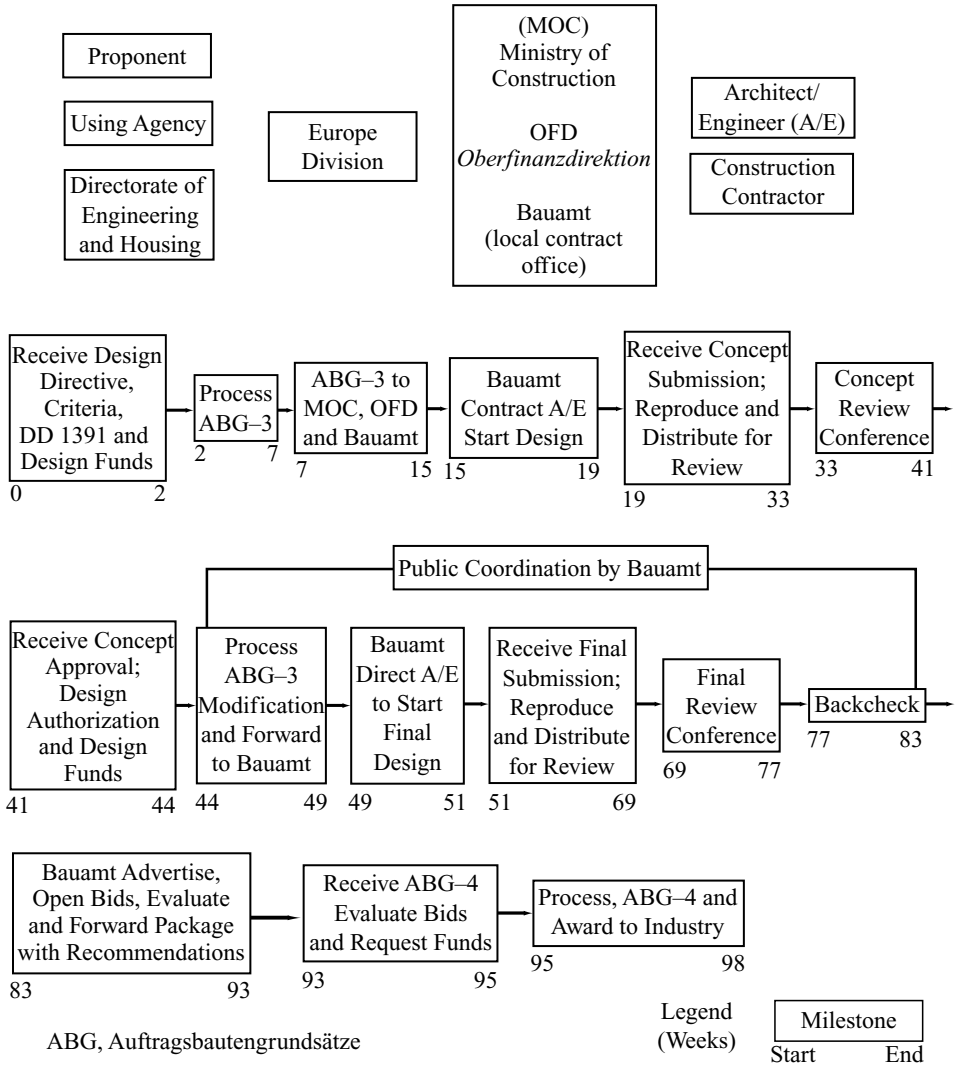


Value Engineering

In addition to guiding a project through the various phases of design and construction, EUD administered a value-engineering program. Value engineering is a systematic approach to reducing costs in a project without changing its original function or scope. Designs for a project selected for value engineering might be reviewed by an in-house team or examined by an architect-engineer firm to see how savings could be achieved by changing aspects of the design or construction.[35]

In 1974, when the Europe Division was established, regulations set out by the Office of the Chief of Engineers located the value engineering function in the division's Executive Office. Although value engineering was applied to direct design projects during the 1970s, the German construction industry never thought it necessary, asserting that they did it "in the

Chart 13: Indirect Method of Contracting and Project Milestones



normal course of design." In fiscal year 1983 the Office of the Secretary of Defense, concerned about the rising costs of military construction, set a goal to save 2 percent of the total budget for military construction through value engineering. The Pentagon increased the goal to 5 percent in fiscal year 1984 and to 6 percent in fiscal year 1986.[36]

The committee established to oversee the value engineering program at EUD selected projects for examination that promised potential savings. This committee, headed by the deputy commander, tried to apply value engineering during the design phase of a project, before the concept review meeting. The value engineering report went to the original designer, who

reviewed it and incorporated appropriate changes into the design. During the construction phase, the contractor could initiate a value-engineering change proposal, documenting an alternate and more economical solution or method of accomplishing specific parts of the project. If the proposal was accepted, the contractor received 55 percent of the net savings.

In fiscal year 1984 the chief of engineering, Joe G. Higgs, took over responsibility for value engineering and located it in the Project Management Branch. During fiscal years 1985 to 1987, EUD doubled the number of its value-engineering studies from twenty-four to approximately fifty annually. More savings through the application of value engineering translated into more construction projects, because additional projects could be authorized from the savings on previous projects. In 1989, to conform to USACE regulations, the division engineer returned value engineering to the Executive Office.

The elements of design and construction in EUD were long, laborious, and labor-intensive in ways peculiar to the European setting. The Engineering Division's Project Management Branch tracked each project through the design phase, at which point responsibility for the project passed to the Construction Division. Effective communication between the two divisions was crucial to the process but not always achieved. People who worked in the Construction Division frequently complained that designers took too little account of constructibility and failed to incorporate into subsequent designs the lessons learned during construction. People in the Engineering Division claimed that those in construction lacked imagination, flair, and creativity.[37]

Projects and Funding

Money for design and construction, or for other technical activities such as design review or advice on master planning, came from one of three sources: the United States government, NATO, or the governments of the host nations. Each of these lines of funding supported a variety of programs.

Tracking the funds for any one project was complicated because, within legal limits prescribed by the funding authorization, EUD was able to combine funds from several sources to support projects. Hospital renovations, for example, used dollars from MCA and OMA appropriations, Deutschmarks from the Modernization of United States Facilities (MOUSF) program, and (or) other host-nation funds. Some funding arrangements were straightforward, such as MCA programs within USAREUR. Others were more convoluted: For certain facilities the United States initiated construction and then sought compensation from NATO, so that NATO monies became mixed with MCA funds.[38]

U.S. Funding

U.S. funds included several categories of monies appropriated by Congress: Military Construction, Army (MCA); Minor MCA (MMCA);

Table 6

Military Construction, Army, Annual Allotments
Fiscal Years 1975–1986

Fiscal Year	Program Funding ($ million)	Fiscal Year	Program Funding ($ million)
1975	$ 31.641	1981	201.0
1976	58.188	1982	294.0
1977	59.995	1983	262.0
1978	185.675	1984	313.0
1979	213.875	1985	255.0
1980	113.0	1986	337.0

Military Construction, Air Force (MCAF or MCP); Military Construction, Navy (MCN); Operations and Maintenance, Army; Air Force family housing; Army family housing; Department of Defense contingency funds; and Department of Defense dependent schools. EUD also worked with nonappropriated funds and commissary surcharge monies. This list is suggestive, not exhaustive.

EUD managed all work in Europe funded under MCA (*Table 6*) and all work funded under the agreements with Germany to pay the costs of U.S. forces protecting their territory. During the 1970s USAREUR's entire allotment of MCA money averaged less than $50 million annually.[39] Still, within these limits EUD workload increased significantly between July 1975 and late 1977. Design workload, expressed as the programmed cost of building the projects in design, went from $279 million and 246 projects in fiscal year 1974 to about $430 million and 554 projects in fiscal year 1975, then jumped to $1.3 billion by late 1977. The largest dollar increases came in work funded by MCA, but work to support facilities (OMA and family housing rehabilitation) supplied the greatest number of projects.[40]

Between May 1976 and August 1978, EUD completed $34.4 million of MCA construction.[41] By the end of the decade, USAREUR's annual MCA allotment had increased to over $200 million. EUD workload increased accordingly, and it continued to increase during the 1980s. The trend was not an uninterrupted progression, however; in the summer of 1979 EUD's division engineer, Brig. Gen. Drake Wilson, notified the chief of engineers, Lt. Gen. John Morris, that his "most serious problem was the current shortage of MCA design funds."[42]

In addition to projects such as ammunition storage and medical facilities, MCA funds paid for facilities modernization (the dollar-funded pro-

gram that followed MOUSF), pollution control, storage of weapons and equipment, missile sites, energy production, training and training facilities, weapons facilities, physical fitness, barracks, and projects related to the combat mission of the forces. EUD also executed work for the Air Force and the Navy with funds appropriated for MCAF and MCN.

Funds allocated for OMA financed alterations, repair, and maintenance. Appropriated annually, OMA funds had to be obligated in the same fiscal year, and their use was restricted to specific purposes. During the 1970s, OMA funds were limited to new construction or alterations costing no more than $75,000 and to repair projects costing less than $300,000, as long as the costs of repair did not exceed half of the cost of replacing the facility. The secretary of the Army had to approve repair projects involving new construction that exceeded $300,000 and maintenance projects that exceeded $300,000. Practically speaking, such projects came within the approval authority of the community commander, because they were routinely approved in Washington.[43] New programs initiated in the late 1970s, including maintenance, repair, and improvement (discussed in *Chapter 12*), increased EUD's flexibility in using OMA funds.

MCA, MCAF, MCN, and OMA funds provided the largest part of EUD's regular funding from dollar appropriations. Dollar funding for programs other than MCA and OMA was less predictable, and these programs were therefore less significant in EUD's early years. Family housing, facilities modernization, schools, and other quality-of-life projects became a major focus of the division's attention only in the 1980s. OMA and German-funded projects provided the basic workload during the first two years of the Europe Division.[44]

Host-Nation Funds

To cover some of the costs of stationing U.S. troops as a part of the NATO mutual defense pact, countries provided "host-nation funds."[45] By far the most important country for the support of USAREUR's combat mission was the Federal Republic of Germany. Since the end of the occupation in 1955, the West German government had provided various forms of financial support to the United States to offset the costs of stationing troops in the Federal Republic of Germany. The MOUSF program, for example, was paid for through the agreements between the United States and the Federal Republic of Germany.[46] (*See descriptions of MOUSF projects in Chapters 6 and 10.*)

Another program, Alternate Construction, was derived from practices begun before the end of the occupation. A series of bilateral agreements dating from the mid-1950s to the mid-1960s formalized the program. In exchange for a facility occupied by U.S. forces, the government of the Federal Republic would construct an equivalent facility at a site agreeable to the United States. When the Germans wanted a facility returned, negotiations for an alternate facility revolved around the scope of work, the quality, and the location, but not the cost. German agencies and contrac-

NATO provided funds to support the Common Infrastructure Program, which included this operations building in Incirlik, Turkey.

tors did all the design work as well as the construction. USAREUR provided OMA funds to cover EUD's costs of managing the program.[47]

NATO Funds

EUD had little to do with NATO construction when the U.S. forces did not use the facilities. When the United States was designated primary or exclusive user, the division reviewed plans and monitored construction for the project as requested by USAREUR or the United States Air Forces in Europe. NATO funding supported a diversity of construction projects and programs as a part of the common defense mounted by the countries of the Atlantic alliance. The largest category of NATO funds supported the Common Infrastructure Program, which financed such undertakings as airfields; facilities for petroleum, oil, and lubricants (POL); naval bases; communications facilities; navigational aids; training facilities; headquarters facilities; warning installations; surface-to-air and surface-to-surface missile sites; ammunition storage sites; forward storage sites; and reinforcement support.[48]

Projects in these categories could be funded in three ways. First, they could be funded solely by NATO under its annual budget, where an allotment is designated as a *tranche* in French and translated as a "slice" in English. These annual NATO allotments for construction began in 1950 and were numbered consecutively.[49] The NATO program trends and slice num-

bers for fiscal years 1975–1981 are given in *Table 7*. Second, projects could be conjunctively funded; that is, the United States contributed funds to provide for features that NATO criteria would not allow. NATO criteria, drawn with wartime conditions in mind, were exceedingly austere. Because U.S. troops used the facilities extensively in peacetime, the United States upgraded NATO projects to provide more amenities. When an American project and a NATO project shared common features, usually utilities, the costs of such features were shared based on a ratio of projected usage. A project might have both conjunctive funding and cost sharing.[50] Third, projects could be prefinanced; that is, the United States put up the money in the expectation that NATO would reimburse the advance. To ensure recoupment (the word used by both NATO and the United States), EUD personnel maintained detailed records during the project to satisfy NATO's accounting requirements. The Europe Division continued the Recoupment Section established by the Engineer Command. The recoupment process was tedious, and there was no assurance that NATO would approve repaying the money. EUD received special funding from Congress to pay the overhead in monitoring projects funded by NATO or prefinanced by the United States.[51]

Table 7

North Atlantic Treaty Organization (NATO) Annual Allotments
Fiscal Years 1975–1981

NATO Slice	Fiscal Year	Program Funding ($ million)
26	1975	$ 26.0
27	1976	10.7
28	1977	13.5
29	1978	57.8
30	1979	16.8
31	1980	287.3
32	1981	277.5

Construction Workload

The execution of EUD construction between May 1976 and August 1978 is summarized in *Table 8*.[52] In this 28-month period, fiscal year statistics were skewed because the government created a fifth fiscal quarter (FY 7T, 1 July to 30 September 1976) when it shifted the beginning of its fiscal year from 1 July to 1 October. Nonetheless, the table represents EUD's activity in the years before the increased tempo of the 1980s.

The first seven programs listed, funded by U.S. dollars appropriated by Congress, constituted almost 60 percent of EUD construction. Modernization of U.S. Facilities, Alternate Construction, and the garrison in Garlstedt were funded by the Federal Republic and represented another 35 percent. NATO funded the A Priori program, and the government of the Shah of Iran paid for work in Iran.[53]

It is difficult to compare the workload of the Europe Division for 1976–1978 with the EUD construction in fiscal year 1984 (*see Table 9*) because the

Table 8

Europe Division Construction Execution
May 1976–August 1978

Program	Number of Projects	Program Funding ($ million)	Percent of Total
Military Construction, Army	40	$34.4	15.1
Minor Military Construction, Army	17	2.76	1.2
Operation and Maintenance, Army	23	5.18	2.3
Military Construction, Air Force	32	82.0	36.0
Military Construction, Navy	11	7.1	3.1
Family Housing	27	3.4	1.5
Other	10	0.9	0.4
Modernization of U.S. Forces	59	44.9	19.7
Alternate Construction	7	8.0	3.5
NORTHAG [Garlstedt]	3	26.0	11.4
A Priori	1	3.2	1.4
Iran	7	10.0	4.4
Total	237	$ 227.84	100

Adapted from "EUD in Perspective, 1976–1978."

division did not use comparable statistics. Only three categories—MCA, MCAF, and OMA—remain the same. As a result, the figures indicate trends and significant shifts in the quantity of work at hand; they cannot be a precise measure of specific categories of work from one period to the next.

By 1984 the volume of work handled by EUD had increased dramatically. In construction placement, the total dollar value for the first nine months of 1984 ($269 million) exceeded the total value for the twenty-eight months from May 1976 to August 1978 ($227.8 million). For the entire fiscal year of 1984, construction placement totaled $403 million.[54] The share of funding for construction placement coming from dollar appropriations (72.8 percent) rose sharply. The NATO share for 1984 totaled $255 million. Host-nation funding does not appear in any identifiable category in the figures for 1984.

Projects and Area Offices

In addition to analyzing the types of contracts and sources of funds, the work of the Europe Division may also be reviewed in terms of where

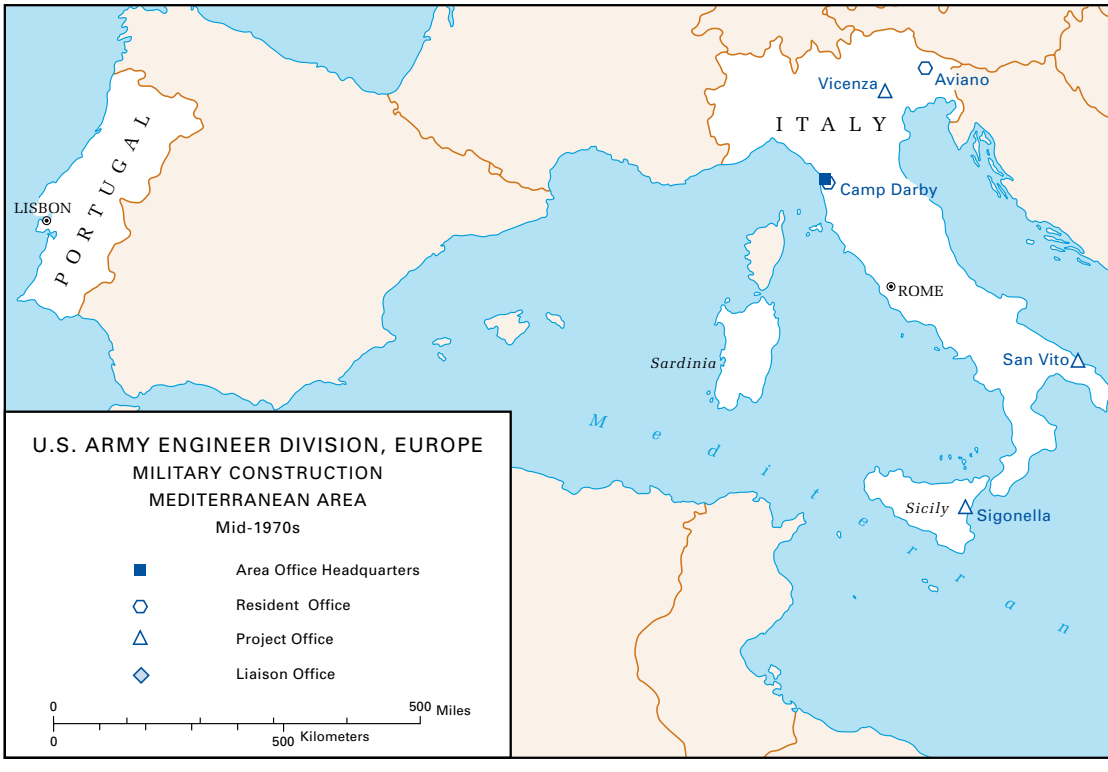
Table 9

Europe Division Construction Execution
1984

Program	Number of Projects	Design Workload of all Programs Fiscal Year 1984		Construction Placement (Fiscal Year 1984 to June 30 Only)	
		Program Funding ($ million)	Percent	Program Funding ($ million)	Percent
Military Construction, Army	396	$1.428	41.8	$127.0	47.2
Minor Military Construction, Army	418	795.0	23.3	15.0	5.6
Operation and Maintenance, Army	221	202.0	5.9	45.0	16.7
NATO	76	255 .0	7.5	52.0	19.3
Department of Defense/National Air Force (NAF)	84	227 .0	6.6	21.0	7.8
AFFH	2	63.0	1.8	--	--
AFH	112	296.0	8.7	--	--
FH	--	--	--	9.0	3.4
Miscellaneous	45	151.0	4.4	--	--
Total	1,354	$3.417	100.0	$269.0	100.0

Source: Engineer Studies Center, "U.S. Army Engineer Division, Europe (EUD), Organization Study," April 1985, pp. 7–11.

the projects were located. In 1974 EUD territory was entirely within continental Europe, and the vast majority of work was in the Federal Republic of Germany. EUD initially established area offices in Stuttgart, Frankfurt, and Kaiserslautern, the cities in which USAREUR maintained headquarters for its three major commands—VII Corps, V Corps, and the 1st Support Brigade (later the 21st Support Command), respectively. Each area office maintained a resident engineer office in its home city and established other resident offices to serve clusters of military communities. In 1974 the division had resident engineer offices at Bad Kreuznach, Giessen, Nuremberg, Würzburg, Augsburg, Bitburg, and Heidelberg.



Map 19

From this basic structure of field offices, EUD opened and closed area offices, resident offices, and project offices as the construction workload shifted.[55] The Northern Area Office opened in 1975. Located first in West Germany, it soon moved to Hoensbroek, Netherlands, just across the border from Aachen, West Germany. The Northern Area Office managed work in Belgium, the Netherlands, Luxembourg, and northern Germany, a geographic area equal to the combined area of all the other area offices in Germany.[56]

In February 1976 EUD assumed the responsibility for USAREUR and NATO construction in Italy, Greece, and Turkey. EUD took over office space from the Mediterranean Division at Camp Darby near Livorno, Italy, and incorporated some staff to create the Mediterranean Area Office. In addition to a resident office at Camp Darby, EUD established a resident office in Aviano and project offices in Vicenza, San Vito, and Sigonella in Italy, as well as a resident office in Athens, Greece, and a project office in Iraklion on the island of Crete. In Turkey, EUD inherited a resident office at Incirlik Air Base near Adana, the TUSEG Liaison Office in Ankara, and a project office in Sinop on the Black Sea.[57]

Although Iran was outside its defined geographic area of responsibility, EUD also accepted fully reimbursable construction work in Tehran.[58] The

Mediterranean Division had handled work in Iran in the 1950s and 1960s, and Brig. Gen. Louis W. Prentiss, Jr., commander of the Europe Division in the mid-1970s, accepted the turnover of responsibility to the division, citing this work as an example of EUD's ability to respond to challenges. In May 1976 the work involved only design, but within two years EUD had placed over $10 million in construction funded by the Iranian government.[59]

Incorporating several Mediterranean countries into EUD in 1976 marked the last major addition of territorial responsibility for the division. In 1980 responsibility for construction in Italy and Greece passed to the Navy, but within two years the Navy asked EUD to reassume management of construction in those countries.[60]

Volume of Work in the 1970s

Throughout the 1970s EUD's five area offices supervised a growing number of construction projects for the U.S. military. The Mediterranean Area Office had the lightest construction load but a fairly large staff because of its far-flung resident offices and the requirement to retain locally hired Italians when the Mediterranean Division was inactivated. (*Map 19*) In 1980 its construction placement was less than one-eighth that of the Southern

Area Office in Stuttgart, which had the largest placement, and one-fourth that of the Northern Area Office. The unevenness of work for the area offices is evident from the construction placement for fiscal years 1979 and 1980.[61] (*Table 10*)

This unpredictability made planning and manpower assignments very difficult. For fiscal year 1979, for instance, the Southwest Area Office had projected construction placement of $52 million; the office constructed only half that amount because the Air Force shifted projects to NATO.[62]

Table 10

Construction Placement by Area Office Fiscal Years 1979 and 1980

Area Office	Fiscal Year 1979 ($ million)	Fiscal Year 1980 ($ million)
Northern	$36.6	$32.1
Central	38.3	58.5
Southwest	25.8	48.5
Southern	61.5	60.5
Mediterranean	8.8	8.2

Projects in the 1980s

As construction placement increased, EUD headquarters recognized bottlenecks in the decision-making process. In 1980 EUD reorganized the Construction Division, redefining the relationship between area and resident offices and headquarters and establishing additional area offices in Nuremberg and Würzburg. A year later the division increased manpower and administrative support in the area offices and upgraded both TUSEG and Heidelberg to area offices. Under the influence of John Blake, chief of construction after 1981, the trend toward decentralization and increased support for the field continued as construction placement increased during the 1980s.

Throughout most of the 1980s the Frankfurt Area Office led other area offices in construction placement, with a full range of projects for V Corps military communities. In 1986 Frankfurt had as much work as several of the other area offices combined, but by the late 1980s its workload had decreased to $60 million annually.

In 1984 the Stuttgart Area Office had a relatively small staff of between twenty-eight and thirty-two people, some of whom worked in the area office and others in the Augsburg Resident Office. In the next four years construction placement jumped from around $24 million to $60 million annually, and Stuttgart opened a resident office in Garmisch. In 1989, when work in the Heidelberg area declined, that area office was downgraded to a resident office and put under the Stuttgart Area Office.

In the 1980s as much as 80 percent of the Kaiserslautern Area Office workload was for the Air Force. With resident offices in Bitburg and Hahn, this office served six air bases—Ramstein, Sembach, Zweibrücken, Spangdahlem, Hahn, and Bitburg—as well as Army installations in Kaiserslautern, Pirmasens, Worms, and Zweibrücken. In 1984 the Kaiserslautern Area Office's construction placement was $36 million; in

The Nuremberg Area Office supervised the construction of Pinden Barracks in Nuremberg, Germany.

1987 that amount more than doubled. In 1989 construction placement topped $100 million.

The Nuremberg Area Office's major customers were the 1st Armored Division, 2d Armored Cavalry Regiment, Seventh Army Training Center, and Department of Defense Dependent Schools. (*See Map 20.*) This office handled the programs to upgrade the firing ranges in Grafenwöhr and construction at the training areas of Hohenfels and Vilseck. In 1985 construction placement was $68 million; in 1986 it was $85 million; and by 1989 it had risen to over $100 million. Staff increased from thirty-eight in 1985 to eighty in 1989. To manage this construction, the area office was organized with resident offices in Nuremberg and Vilseck and project offices in Ansbach, Nuremberg, Bamberg, Grafenwöhr, Vilseck, and Hohenfels.[63]

The EUD office in Würzburg supported the 3d Infantry Division and all of its subelements. The office also handled construction projects associated with the Wildflecken Training Area and supported an airfield in Giebelstadt. In 1980 EUD upgraded Würzburg from a resident to an area office. The Würzburg office had eleven staff members; the number increased to twenty-three by 1982 and continued to rise until 1990. EUD also established resident offices in Schweinfurt and Würzburg and project offices in Wildflecken and Aschaffenburg.

The Northern Area Office, the only area office to retain its geographic name after the reorganization of 1980, continued through the 1980s to

Map 20

serve air bases in the Benelux countries. When the Ground Launched Cruise Missile program was introduced, construction was extended to air bases in Florennes, Belgium, and Woensdrecht, Netherlands; in 1986 resi-

The Northern Area Office was responsible for this headquarters building at an air base in Florennes, Belgium.

dent offices were established at both bases. The volume of work for fiscal year 1987, $79 million in construction placement, was 172 percent higher than the workload for fiscal year 1986.[64] In 1988 the Rheinberg Resident Office opened, and a project office for the Supreme Headquarters, Allied Powers Europe, opened in February 1989. In the late 1980s the Northern Area Office extended its territory when the Navy asked EUD to oversee construction of two NATO-funded contingency hospitals in northern Norway. Norway would not allow EUD to establish an office near the construction, so Northern Area Office personnel handled the projects from Hoensbroek on temporary duty assignments.[65]

In Turkey, the construction program that began with a single contract in 1980 grew rapidly as the Army, Air Force, and NATO sought to improve living and working conditions for soldiers and airmen and to strengthen Turkey's ties to North Atlantic defense. Brig. Gen. James W. Ray, the commander of the Europe Division in the mid 1980s, observed, "From the overall perspective of the Europe Division, the construction program in Turkey was important, and more important than the amount of money would indicate."[66] The construction program in Turkey had four components: (1) upgrades of MCA facilities at five remote sites (Erzurum, Corlu, Ortakoy, Izmit, and Cakmakli) used by the Army group headquartered outside of Istanbul; (2) construction to improve working and living conditions for the Army intelligence command in Sinop on a spit of land jutting into the Black Sea; (3) construction for the Air Force at the main operating air base of Incirlik near Adana and at a second smaller air base

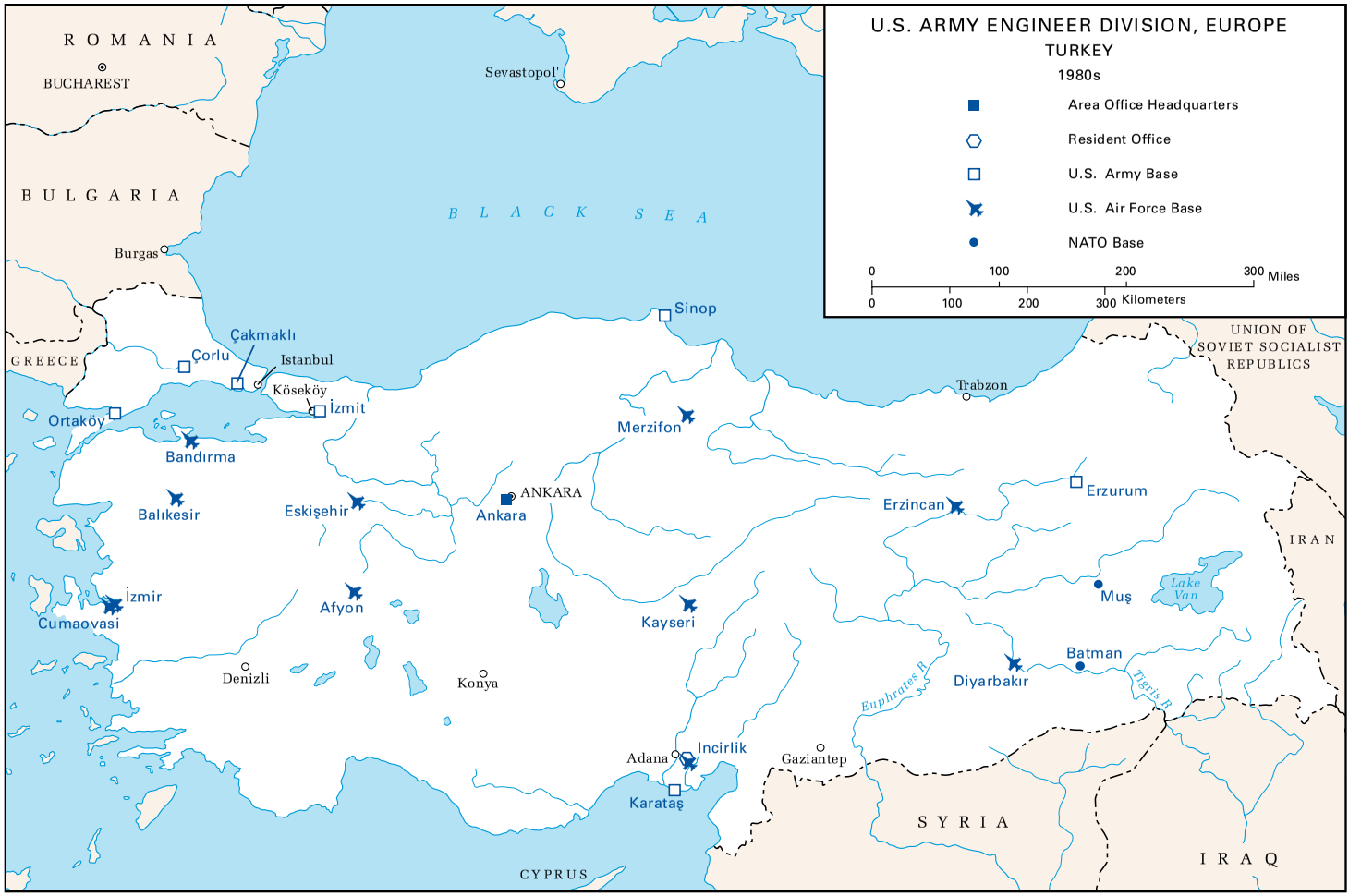
near Ankara used by airmen assigned to Turkey-U.S. Logistics Command; and (4) prefinanced construction for NATO of two air bases, one an entirely new base in Mus in eastern Turkey near Lake Van, and the other in Batman, a base built under austere NATO standards in the 1950s.[67] (*Map 21*)

Although the Navy assumed responsibility in 1980 as the Department of Defense agent for construction in Greece, political turmoil and public objections to U.S. bases made it difficult to work on the projects approved in the fiscal year 1984 MCA budget. The U.S. European Command asked EUD to help, and in the autumn of 1985 William Camblor began new negotiations that led to an agreement signed with the Greek government in the summer of 1986. Camblor negotiated direct design, but all construction remained indirect.[68] In the late 1980s the Greece Resident Office monitored work on seven special warehouses under programs designed to make stored ammunition secure against theft by terrorists.[69]

Concerns in the Field

Maintaining continuity of supervision in the field concerned EUD leaders. Although lengthy construction projects might have three or four American civilian project engineers, the locally hired employees (Germans, Turks, Greeks, and others) helped provide continuity. Military officers received three-year assignments as area engineers, although several serving in the 1980s arranged to stay longer. Lt. Col. Lloyd Colio

Europe Division construction sites in Turkey included Sinop on the Black Sea.


U.S. ARMY ENGINEER DIVISION, EUROPE
TURKEY
1980s
Area Office Headquarters
Resident Office
U.S. Army Base
U.S. Air Force Base
NATO Base
0 100 200 300 Miles
0 100 200 300 Kilometers
ROMANIA
BUCHAREST
BULGARIA
GREECE
BLACK SEA
Sevastopol'
Burgas
Sinop
Çakmaklı
Çorlu
Istanbul
Köseköy
İzmit
Ortaköy
Bandırma
Balıkesir
Eskişehir
ANKARA
Ankara
Merzifon
Trabzon
UNION OF SOVIET SOCIALIST REPUBLICS
Erzincan
Erzurum
IRAN
Lake Van
Muş
Batman
Diyarbakır
Euphrates R.
Tigris R.
İzmir
Cumaovasi
Afyon
Kayseri
Denizli
Konya
Adana
Incirlik
Gaziantep
Karataş
SYRIA
IRAQ
CYPRUS

Map 21

Europe Division's acquisition of an airplane facilitated staff travel to and from the division's far-flung offices. John Blake, Chief of Construction, is at right.

served as Stuttgart area engineer from 1984 to 1990. Lt. Col. Grosvenor "Bud" Fish, Jr., remained in Nuremberg from 1982 to 1992, first as a community director of engineering and housing and then as EUD area engineer. Similarly, Lt. Col. Robert Mentell served as director of engineering and housing in Würzburg from 1982 to 1985 and then as area engineer from 1985 to 1988. Civilian Robert Rodehaver served in the Frankfurt Area Office as deputy from 1974 to 1980 and then as area engineer for more than a decade. In area offices where military commanders changed frequently, the civilian deputy provided continuity: Richard Grimm served in Turkey from 1982 to 1990; Wayne Lewis worked in Kaiserslautern as office engineer from 1975 to 1980 and as deputy from 1982 to 1990; Dave Cox was in Stuttgart from 1977 to 1979 and from 1983 to 1991; and Jim Mulford stayed in Würzburg from 1981 to 1990.

Headquarters in Frankfurt had trouble keeping in touch with the field offices. When EUD took over the Mediterranean area, General Prentiss argued in vain for an airplane to give him access to the far-flung territories. Prentiss did not get an aircraft, but his successors did; from 1976 to 1988 the division had a twin-engine Beechcraft airplane and four pilots. The plane greatly facilitated travel for the commanders and program managers, particularly to Italy, Greece, Norway, and Turkey. John Blake made an effort to visit each area office at least quarterly.

Blake's visits to Turkey were particularly important because the difficulties the TUSEG staff encountered when communicating with Frankfurt

could be overwhelming.[70] Military telephone service was uncertain and commercial service no better. Computers with modems were installed during the mid-1980s, but only when EUD introduced facsimile machines in the area office and in each resident and project office in the summer of 1989 did communications for the staff in Turkey become satisfactory.[71] Veronica Rovero, an engineer who had worked at headquarters in Frankfurt before her tour in Turkey, observed that "the fax serves as both instant communications and an answering machine, since the one guy in the field is usually out of the office. Being able to send a message via fax saves making numerous unanswered phone calls."[72]

Technology could not, however, change attitudes or alter feelings. Overall, the staff in area, resident, and project offices felt removed from the activities, tensions, and changes in Frankfurt. For many, work in the field meant action, excitement, independence, and satisfaction. But they also experienced isolation and, in some instances, hardship conditions.[73] Veronica Rovero articulated the feelings of frustration felt by some EUD employees in the field: "The Phillips Building *is* EUD for those people. They forget about the people out on the fringes who are struggling, floundering, and doing the best that they can under whatever circumstances."[74]

Throughout the organizational changes, fluctuations in funding, and turnover of personnel, the mission of the Corps of Engineers in Europe remained unchanged. To accomplish its mission, EUD needed people to move the projects through design to construction and to monitor contractors in half a dozen languages. The range and array of programs and projects managed by the Europe Division was vast.